

PENNSYLVANIA RAILROAD: BRICK VIADUCT  
Parallel to Schuylkill River,  
NW of Spring Garden Street  
Philadelphia  
Philadelphia County  
Pennsylvania

HAER No. PA-38

HABS  
PA,  
31-PHILA,  
696-

**PHOTOGRAPHS**

**WRITTEN HISTORICAL AND DESCRIPTIVE DATA**

Historic American Engineering Record  
National Park Service  
Department of the Interior  
Washington, DC 20013-7127

HAER  
PA,  
51-PHILA,  
696-

HISTORIC AMERICAN ENGINEERING SURVEY

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

**PENNSYLVANIA RAILROAD: BRICK VIADUCT**

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INVENTORY OF PHOTOGRAMMETRIC IMAGES

The glass photogrammetric plates listed below are not reproducible except with special permission. However, reference prints and film copy negatives have been made from the plates indicated by an asterisk (\*) and are included in the Library of Congress collection of formal HABS/HAER photographs.

- 2      5" x 7" glass plate negatives (one stereopair) produced by  
Perry E. Borchers of the Ohio State University in 1971.

One survey control contact print from each plate; survey  
control information for each pair.

LC-HAER-GS05-B-1971-201L \*      VIEW FROM SCHUYLKILL RIVER, FROM EAST, LEVEL

LC-HAER-GS05-B-1971-201R \*      VIEW FROM SCHUYLKILL RIVER, FROM EAST, LEVEL  
(Plate broken and repaired)

Left and right overlap: 95%

PROJECT INFORMATION STATEMENT

Photogrammetric images were incorporated into the HABS/HAER collections in the summers of 1985 and 1986. Inventories of the images were compiled and filed as data pages for each structure recorded. Since the glass photogrammetric plates are not reproducible except with special permission, a reference print and film copy negative were made from one plate of each stereopair and from the most informative plates in sequential sets. The reference prints and copy negatives were then incorporated into the formal HABS/HAER photograph collections.

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**Data (Page 2)**

The Photogrammetric Images Project was a cooperative endeavor between the HABS/HAER Division of the National Park Service and the Prints and Photographs Division of the Library of Congress. The reference prints and film copy negatives of the original plates were made by the Library of Congress Photoduplication Service with funds provided by the Library of Congress Flat Film Preservation Fund. Additional reproductions were made by HABS/HAER. The project was supervised by HABS/HAER Architect John A. Burns, AIA, and completed by HABS Historians Jeanne C. Lawrence (University of London) in 1985 and Caroline R. Alderson (Columbia University) in 1986.

PENNSYLVANIA RAILROAD, WEST PHILADELPHIA ELEVATED  
(Pennsylvania Railroad, Brick Viaduct)  
(High Line)

HAER No. PA-38

Pennsylvania Historic Railroad Bridges Recording Project  
Parallel to Schuylkill River, north of Arsenal Bridge  
Philadelphia  
Philadelphia County  
Pennsylvania

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ADDENDUM TO  
PENNSYLVANIA RAILROAD, BRICK VIADUCT  
Parallel to Schuylkill River, northwest of Spring Garden St.  
Philadelphia  
Philadelphia County  
Pennsylvania

#### PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

HISTORIC AMERICAN ENGINEERING RECORD  
National Park Service  
1849 C Street, NW  
Washington, DC 20240

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PA  
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HISTORIC AMERICAN ENGINEERING RECORD

PENNSYLVANIA RAILROAD, WEST PHILADELPHIA ELEVATED  
(Pennsylvania Railroad, Brick Viaduct)  
(High Line)

ADDENDUM TO  
PENNSYLVANIA RAILROAD, BRICK VIADUCT

This report supplements two (2) data pages previously transmitted to the Library of Congress.

This addendum covers the entire West Philadelphia Elevated, of which the brick viaduct is only part.

Location:	Parallel to Schuylkill River, north of Arsenal Bridge, Philadelphia, Philadelphia County, Pennsylvania.
USGS Quadrangle:	Philadelphia, Pennsylvania-New Jersey (7.5-minute series).
UTM Coordinates:	18/484140/4423530
Date of Construction:	1903.
Basis for Dating:	Construction contracts.
Date of Alteration:	1932.
Designer:	William H. Brown (chief engineer, Pennsylvania Railroad).
Fabricators:	American Bridge Co. (Trenton) and Pencoyd Iron Works.
Builders:	Steel portion: American Bridge Co. and Pencoyd Iron Works, superstructure; John Goll & Co. (Philadelphia), substructure. Brick portion: Sparks & Evans (Philadelphia).
Present Owner:	CSX Transportation.
Present Use:	Railroad bridge.
Structure Types:	Brick arch; pin-connected and riveted deck trusses; riveted deck and half-through girders.

PENNSYLVANIA RAILROAD, WEST PHILADELPHIA ELEVATED  
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**Significance:** The West Philadelphia Elevated, part of the Pennsylvania Railroad's program to separate passenger and freight traffic, includes the country's largest brick arch viaduct.

**Historian:** Justin M. Spivey, April 2000.

**Project Information:** The Historic American Engineering Record (HAER) conducted the Pennsylvania Historic Railroad Bridges Recording Project during 1999 and 2000, under the direction of Eric N. DeLony, Chief. The project was supported by the Consolidated Rail Corporation (Conrail) and a grant from the Pennsylvania Historical and Museum Commission (PHMC). Justin M. Spivey, HAER engineer, researched and wrote the final reports. Preston M. Thayer, historian, Fredericksburg, Virginia, conducted preliminary research under contract. Jet Lowe, HAER photographer, and Joseph E. B. Elliott, contract photographer, Sellersville, Pennsylvania, produced large-format photographs.

### **Description and History**

The Pennsylvania Railroad (PRR) constructed the two-track West Philadelphia Elevated or "High Line" in 1903 to eliminate conflicts between passenger and freight traffic. This was but one of a number of improvements to freight operations in eastern Pennsylvania during the administration of PRR President Alexander J. Cassatt. Other items proposed by Cassatt in 1902 included grade reduction on the Trenton Cut-Off, and construction of the Philadelphia & Thorndale and Atglen & Susquehanna branches, the completion of which provided a freight bypass of the PRR's main line between Trenton and Harrisburg.<sup>1</sup> The High Line served a similar purpose, but for freight traffic heading south on the Philadelphia, Baltimore & Washington Railroad (PB&W), a PRR subsidiary. Rising from the PRR's West Philadelphia yard, the High Line carries freight for about 3.7 miles over passenger lines and city streets. Its southern end connects with the Arsenal Bridge into South Philadelphia, and with the PB&W's Maryland Division. Although the PRR's engineering department designed the High Line, the PB&W contributed at least part of the construction costs, as noted in its annual reports.<sup>2</sup> Contractors began work on the High Line soon after the Philadelphia city council passed an ordinance authorizing construction on 24 December 1902. The city's Department of Public Works remained involved throughout the process, with Chief Engineer George S. Webster reviewing the PRR's plans and periodically corresponding with PRR Chief Engineer William H. Brown.<sup>3</sup> Work seems to have been completed during 1903.

The High Line consists of filled embankments approaching a viaduct approximately 8,140' long. For construction, the viaduct was divided into three sections: seventy steel spans numbered from Market Street south to the Arsenal Bridge wye, fifty-five steel spans numbered

from Market Street north to Spring Garden Street, and thirty brick arches on stone piers from Spring Garden Street northwest to 34th Street.<sup>4</sup> There is also a 110'-6" riveted steel half-through girder over Market Street, for a total of 126 steel spans. Steel trestle bents support most of the steel portion, although the longest spans have piers of the same stone found in the masonry portion. All spans currently date to 1903, except for the southernmost five, which the PRR replaced in 1932 during construction of new tracks approaching 30th Street Station.

Chief Engineer Brown's preference for masonry construction is best shown by the rebuilding of numerous main-line bridges in stone during his tenure. But while the Rockville Bridge set a record for stone construction, the High Line is an equivalent accomplishment in brick. The thirty brick arches northwest of Spring Garden Street, each 30'-0" long between 5'-0"-wide stone piers, may be the country's largest brick structure.<sup>5</sup> This may not have been Brown's intention, however, as the contract for its construction specifies "brick or stone arches."<sup>6</sup> Later correspondence between Brown and Philadelphia contractors Sparks & Evans indicates that concrete arches were considered as well. Sparks & Evans insisted, however, that "we would not wish to be held responsible for construction of this [concrete] character." The choice thus restricted to brick versus stone, brick would seem at a disadvantage because the smaller units are more labor-intensive to install. But time constraints may have ultimately decided the issue, as the contractors indicated that stone for the arches would have taken six months to quarry while they already had "options on large quantities of brick."<sup>7</sup> Indeed, a similar problem occurred with the PB&W's viaduct at Wilmington, Delaware. Explaining why brick arches were chosen for that structure, *Railway Age* cited "the extreme difficulty in getting stone fast enough."<sup>8</sup> The PRR's record-setting brick arch viaduct in Philadelphia was likely born of similar necessity.

The PRR divided construction of the steel viaduct not only north and south of Market Street, but also into substructure and superstructure contracts. John Goll & Company, a Philadelphia firm, constructed stone piers and column foundations south of Market Street, completing them in early 1903.<sup>9</sup> A north-of Market substructure contract could not be found among PRR records. American Bridge Company's Trenton plant fabricated and erected the south-of-Market spans, which are mostly riveted steel deck girders, ranging from 38'-3" to 80'-0" in length, on steel trestle bents. The exceptions are half-through girders over Walnut Street (91'-4" long) and South Street (91'-6" long), and a 156'-0" pin-connected Pratt deck truss at span 41, all on stone piers. American Bridge also built the Market Street span and spans 1 through 13 north of Market. These include eleven half-through girders, ranging from 38'-3" to 92'-8" in length, on steel trestle bents; and two riveted Warren deck trusses, 97'-0" and 121'-3" long, on stone piers. Pencoyd Iron Works fabricated and erected spans 14 through 54 north of Market Street, which are riveted steel deck girders ranging from 40'-0" to 103'-9" in length, and span 55 over Spring Garden Street, a half-through girder 68'-10" long. Steel trestle bents support all but the longest of the Pencoyd spans. Spans 35 through 37, the three longest girders at 103'-9", have stone outrigger piers allowing tracks to pass beneath at an extreme skew angle.<sup>10</sup>

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## Notes

1. Howard W. Schotter, *The Growth and Development of the Pennsylvania Railroad Company: A Review of the Charter and Annual Reports of the Pennsylvania Railroad Company 1846 to 1926* (Philadelphia: Press of Allen, Lane, and Scott, 1927), 281-2.
2. Philadelphia, Baltimore & Washington Railroad Company, *Second Annual Report for the Year 1904* (Philadelphia: Press of Allen, Lane & Scott, 1905), 17.
3. See correspondence between Webster and Brown in file: West Philadelphia Elevated 1902-1904, Box 1474, Chief Engineer, Engineering Department, Pennsylvania Railroad Records, Acc. 1807, Hagley Museum and Library, Greenville, Del.
4. The seventy south-of-Market spans are numbered 1 to 71 in PRR records, with the forty-first span "numbered as two spans (41-42)." See Pennsylvania Railroad, "Index to Erection Plans, West Philadelphia Elevated, Philadelphia, Pa.," dated 5 Sep. 1902, milepost 3.37, region/division/branch 111140, aperture card files, Consolidated Rail Corp., Philadelphia, Pa. [transferred to Norfolk Southern Railway Co., Atlanta, Ga.; hereinafter cited as Conrail aperture cards].
5. David Plowden, *Bridges: The Spans of North America* (New York: W. W. Norton & Co., 1974), 30.
6. Agreement No. 3206, "Sparks & Evans, with the Pennsylvania Railroad Co., for Brick or Stone Arches West of Spring Garden Street, for Elevated Railroad in West Philadelphia, Pa., Dated December 29th, 1902," located in file: Philadelphia - West Philadelphia Elevated 1902-1904, Box 753, Construction Contracts, Engineering Department, Pennsylvania Railroad Records, Acc. 1807, Hagley Museum and Library, Greenville, Del. [hereinafter cited as PRR Construction Contracts].
7. Sparks & Evans, to Brown, 6 Jan. 1903, in file: Arch Bridges - Concrete vs. Masonry 1903, Box 1455, Chief Engineer, Engineering Department, Pennsylvania Railroad Records, Acc. 1807, Hagley Museum and Library, Greenville, Del. Brown quoted this to Cassatt when explaining his choice of concrete over stone for the Atglen & Susquehanna bridge at Shock's Mills; see Brown, to Cassatt, 8 Jan. 1903, in *ibid.*
8. "Pennsylvania Improvements at Wilmington," *Railway Age* 39, No. 13 (31 Mar. 1905): 533.
9. Agreement No. 3207, "Jno. Goll & Co., with the Pennsylvania Railroad Co., for Piers and column foundations So. side Spring Garden St., to N. side of Market St., Elevated R. R. in West Phila., Dated December 29th, 1902," located in file: Philadelphia - West Philadelphia Elevated 1902-1904, Box 753, PRR Construction Contracts.
10. Pennsylvania Railroad, "Index to Erection Plans."

## Additional Source

1. U.S. Department of the Interior, HAER No. PA-71, "Northeast Railroad Corridor," 1977, Prints and Photographs Division, Library of Congress, Washington, D.C. See photographs PA-71-18 and PA-71-19 for aerial coverage of the West Philadelphia Elevated.